

Remarks

The Office Action mailed April 5, 2005 has been fully considered and this Amendment is submitted in response thereto.

Claims 1-31 and 34-41 stand rejected. Claims 32 and 33 stand objected to. This Amendment cancels Claims 1-17, 26-28, 30-33, 36, and 40. Claims 42-45 are newly added. Claims 18, 29, 37, 39, and 41 are newly amended. Upon entry of this Amendment, Claims 18-25, 29, 34-35, 37-39, and 41-45 will be pending in this application.

Applicant believes that there are no fees needed at this time. However, a fee calculation sheet is provided with a conditional authorization to charge the referenced deposit account any necessary fees.

The rejection of Claims 37-40 under 35 U.S.C. § 102(b) as being anticipated by Freeman et al. (U.S. Pat. 5,960,054) is respectfully traversed.

This rejection no longer applies to Claim 40, which has been cancelled.

Freeman discloses a multi-modality diagnostic imaging system. The system includes a CT scanner having a gantry A. An x-ray tube B is rotatably mounted on a rotating frame member or gantry C. The stationary gantry includes a cylinder 10 that defines a patient examination region 12. An array of radiation detectors are disposed concentrically around the patient receiving region. The x-ray detectors are mounted on the stationary gantry portion such that an arc segment of the detectors receives radiation from the x-ray tube B which has traversed the examination region 12. Alternatively, an arc segment of radiation detectors can be mounted to the rotating gantry to rotate with the x-ray tube. (Fig. 1 and col. 3, lines 49-63.) Although it might be asserted that the x-ray detectors of Freeman are angled with respect to one another, Freeman neither teaches nor suggests that the mode of operation in which they are used is other than a CT mode, nor does Freeman teach that separate images of the object are generated using detector panels angled with respect to one another in an x-ray fluoro mode using these x-ray detectors.

Freeman further discloses an angiography system D positioned remote from CT gantry A along a longitudinal axis 25 of the patient support. The support member 30 is a C-arm. An angiographic x-ray source or tube 36 is secured to a first end of C-arm 30. Likewise, an x-ray detector 38 such as an image intensifier tube is secured to a second end of C-arm 30. (Col. 4, lines 48-59.) Nowhere is it taught or suggested by Freeman to provide detector panels angled with respect to one another in an x-ray fluoro mode or to generate separate images of an object from the angled detector panels in an x-ray fluoro mode.

By contrast, Claim 37, as herein amended, recites a method of generating an image of an object using a multimode imaging system, "... wherein at least one said mode of operation is an x-ray fluoro mode wherein separate images of the object are generated using respective detector panels that are angled with respect to one another and wherein the multimode imaging system is configured to determine a location of desired elements in the separate images." See the Application as originally filed at page 11, lines 6-11. It is therefore submitted that Claim 37 is patentable over Freeman.

Claims 38 and 39 are directly dependent upon Claim 37. When the recitations of Claims 38 and 39 are considered in combination with the recitations of Claim 37, it is submitted that Claims 38 and 39 are likewise patentable over Freeman.

Claim 39 has further been amended to recite, "... wherein the first mode of operation is the 3-D image mode and the second mode of operation is the x-ray fluoro mode, and the second mode of operation is used to predict or determine the trajectory of a medical instrument with respect to the desired element location." See page 11, lines 15-23. It is submitted that this feature is also not taught or suggested by Freeman.

It is acknowledged that Nambu discloses a non-planar detector array in Fig. 42 and 42A. However, Nambu teaches the use of such a non-planar detector array in a resampling context. See col. 35, lines 39-64. Insofar as Applicants have been able to determine, Nambu neither teaches nor suggests using a non-planar detector in a mode of operation in which separate images of the object are generated by respective detector panels. By contrast, see Claim 37 and page 11, lines 8-10 of the originally filed Application.

For the above reasons, it is requested that the rejection of Claims 37-40 under 35 U.S.C. § 102(b) as being anticipated by Freeman et al. be withdrawn.

The rejection of Claim 41 under 35 U.S.C. 102(e) as being anticipated by Fujita et al. (U.S. Pat. No. 5,748,696) is respectfully traversed.

The Office asserted that Fujita disclosed operating the imaging system in a 3-D imaging mode to locate a desired element (step A1, col. 14, lines 62-64) and then operating the imaging system in an x-ray fluoro mode to predict or determine the trajectory of a medical instrument (col. 15, line 4) with respect to the desired element (step 4, col. 15, lines 1-4). However, the second mode taught by Fujita et al. is a CT fluoro mode. This type of mode collects data from a scan to generate sequential frames of images. Projection data is processed at a frame rate to construct multiple images. Rotation occurs around the area of interest of the patient and sequential images are reconstructed and displayed. (See Application as originally filed, page 2, lines 20-26. This is to be contrasted with x-ray fluoro mode, in which a flat panel detector is used to take sequential exposures to track dynamic motion in a patient, yielding high sequential resolution. See Application as originally filed, page 2, lines 16-19. Insofar as Applicants have been able to determine, Fujita does not teach or suggest using an x-ray fluoro mode to generate a plurality of images taken at different angles relative to the object, and using the generated plurality of images to locate a desired element in three dimensions in a 3-D image generated in a 3-D image mode.

By contrast, Applicants' Claim 41, as herein amended, recites, "A method of generating an image of an object using a multimode imaging system configured to operate in a plurality of modes of operation, said method comprising operating the imaging system in a 3-D image mode to generate a 3-D image and then operating the imaging system in an x-ray fluoro mode to generate a plurality of images taken at different angles relative to the object, and using the generated plurality of images to locate a desired element in three dimensions in the 3-D image." See Applicants' Application as originally filed at page 10, line 19 to page 11, line 27. For these reasons, it is submitted that Claim 41 is patentable over Fujita et al.

For the above reasons, it is requested that the rejection of Claim 41 under 35 U.S.C. 102(e) as being anticipated by Fujita et al. be withdrawn.

The rejection of Claims 1-12, 15-29, and 34-36 under 35 U.S.C. 103(a) as being unpatentable over Watanabe (U.S. Pat. No. 6,113,264) in view of Freeman et al. (U.S. Pat. No. 5,960,054) is respectfully traversed.

This rejection no longer applies to Claims 1-12, 15-17, 26-28, and 36, all of which have been cancelled.

The Office acknowledged that Claims 32-33 contained allowable subject matter and would be allowable if rewritten in independent form including all the limitations of the base claim and any intervening claim. Specifically, the Office asserted that Nambu fails to teach the system is configured to position the first detector panel at an acute or perpendicular relative to the second detector panel. To reduce the number of claims needing renumbering, Claims 32 and 33 have been combined into Claim 18 using the phrase "at least one of acutely or perpendicularly" (thus allowing, but not requiring that the system necessarily be able to position the first detector panel relative to the second detector panel both acutely and perpendicularly). In addition, the features of the intervening claims have also been inserted into Claim 18. However, the feature wherein images are combined from the selected modes of operation to improve image quality has been deleted from Claim 18, because it is not necessarily related to the configuration of the first detector panel relative to the second detector panel. Applicant believes that this feature is not necessary for patentability in view of the statement of Allowable Subject Matter. It is therefore submitted that Claim 18 is patentable over Watanabe in view of Freeman et al.

Claims 19-25, 29 and 34-35 as herein amended are directly or indirectly dependent upon Claim 18. When the recitations of Claims 19-25, 29, and 34-35 are considered in combination with the recitations of Claim 18, it is submitted that Claims 19-25, 29, and 34-35 are likewise patentable over Watanabe in view of Freeman et al.

For the above reasons, it is requested that the rejection of Claims 1-12, 15-29, and 34-36 under 35 U.S.C. 103(a) as being unpatentable over Watanabe in view of Freeman et al. be withdrawn.

The rejection of Claims 13-14 and 30-33 under 35 U.S.C. 103(a) as being unpatentable over Watanabe et al. as modified by Freeman further in view of Nambu et al. (U.S. 6,196,715B1) is respectfully traversed.

This rejection no longer applies to Claims 13-14 and 30-33, which have been cancelled. It is also believed that this rejection is in error as applied to Claims 32 and 33 because these claims have been specifically indicated by the Office as containing patentable subject matter (see the remarks concerning the objection to Claims 32 and 33 below). Therefore, it is requested that the rejection of Claims 13-14 and 30-33 under 35 U.S.C. 103(a) as being unpatentable over Watanabe et al. as modified by Freeman further in view of Nambu et al. be withdrawn.

The objection to Claims 32-33 as being dependent upon a rejected base claim is respectfully traversed.

Claims 32-33 have been cancelled, and, as indicated above, the features of Claims 32 and 33 and those of the intervening claims have been incorporated into base Claim 18. A feature formerly present in Claim 18 has been removed from the claim, because it does not directly concern the allowable subject matter and is not believed necessary for patentability. The incorporating of Claims 32-33 into Claim 18 reduces the need to amend the dependencies of a number of other claims, or to increase the number of independent claims.

For these reasons, it is requested that the objection to Claims 32-33 be withdrawn.

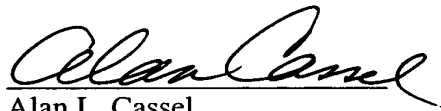
Claims 42-45 are new. Each of Claims 42-45 is directly or indirectly dependent upon Claim 41, as herein amended. It is submitted that Claim 41 is patentable over the prior art for the reasons given above with respect to the rejection Claim 41 under 35 U.S.C. 102(e) as being anticipated by Fujita. When the recitations of Claims 42-45 are considered in combination with the recitations of Claim 41, it is submitted that Claims 42-45 are likewise patentable over the prior art of record.

Moreover, Claims 42-45 each contain additional, separately patentable features. For example, Claim 45 explicitly recites a method in which angled detector panels are oriented

perpendicularly or at an acute angle to one another, a feature asserted by the Office in conjunction with the Office's statement of allowable subject matter.

In view of the foregoing amendments and remarks, all the claims now active in this application are believed to be in condition for allowance. Reconsideration and favorable action is respectfully solicited.

Respectfully Submitted,

A handwritten signature in black ink, appearing to read "Alan Cassel", written over a horizontal line.

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